## Energetic Particle Radiation Hazards to Humans En Route to and on the Martian Surface

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It is foreseen that future missions to Mars will make use of humans as 'intelligent tools' in the exploration initiative. To achieve this objective, knowledge pertinent to maintaining a safe and efficient human presence en route to and at the planet must be built up.

In the present paper, the Mars Energetic Radiation Environment Models (eMEREM and dMEREM), the development of which was recently sponsored by the European Space Agency (Contract No. 19103/05/NL/JD), is used to estimate the effective dose and ambient dose equivalent pertaining under quiet and active solar conditions at three candidate landing sites that display different compositional profiles. These estimates are compared with the doses calculated to be absorbed in the course of representative Cruise Phase transitions to and from the planet under Solar Maximum and Solar Minimum conditions.

Radiation doses currently considered to represent upper limits with respect to the exposure of blood forming organs as well as of the skin and eyes of astronauts over a career lifetime are compared with these figures. Also, the efficacy of present day mitigating strategies for crew protection during manned missions is discussed.